Amendments to the Claims

1 –5. (Canceled)

6. (Previously presented) A method of sputtering a material from a target comprising a metal onto a working substrate supported on a pedestal in a system including a magnetron disposed on a side of said target opposite said pedestal and including an outer pole of one magnetic polarity and surrounding an inner pole of another magnetic polarity, wherein said outer pole extends from a enter of said target to a peripheral portion of said target and has an area smaller than a similarly extending circle and includes two straight portions connected by curved portions, said method comprising:

rotating said magnetron about said center of said target to achieve full sputtering coverage of said target; and

capacitively coupling power into said chamber at least partially by applying DC power to said target but not including inductively coupling power into said chamber to thereby excite said working gas into a plasma to sputter said metal from said target onto said working substrate.

7. (Original) The method of Claim 6, wherein said metal comprises aluminum.

8. (Original) The method of Claim 6, wherein said metal comprises copper.

9. (Original) The method of Claim 6, wherein said metal comprises titanium.

10. (Previously presented) The method of Claim 6, wherein an integrated magnetic flux produced by said outer pole is at least 2.0 times an integrated magnetic flux produced by said

inner pole.

11. (Previously presented) An tungsten fill process, comprising the steps of:

placing a substrate containing a hole formed in a dielectric layer in a magnetron sputter reactor including a titanium target and a magnetron comprising an inner pole of a first magnetic polarity and producing a first total magnetic flux and an outer pole of an opposite second magnetic polarity, producing a second total magnetic flux at least 1.5 times said first magnetic flux, and surrounding said first magnetic pole;

in said magnetron sputter reactor, sputtering a barrier layer of titanium and titanium nitride into said hole while rotating said magnetron about a center of said titanium target; and

thereafter filling tungsten into said hole of said substrate;

wherein there is no anncaling step between said sputtering and filling steps.

12 – 13. (Canceled)

14. (Previously presented) The process of Claim 11, wherein said filling is performed by chemical vapor deposition.

15. (Previously presented) The process of Claim 11, wherein said filling is performed by sputtering.

16. (Previously presented) The process of Claim 11, further comprising rotating said magnetron about a back of
said target.

17. (Previously presented) A tungsten fill process, comprising the steps of:

placing a substrate containing a hole formed in a dielectric layer in a magnetron sputter reactor including a titanium target and a magnetron comprising an inner pole of a first magnetic polarity and producing a first total magnetic flux and an outer pole of an opposite second magnetic polarity, producing a second total magnetic flux at least 1.5 times said first magnetic flux, and surrounding said first magnetic pole;

in said magnetron sputter reactor, sputtering a barrier layer of titanium and titanium nitride into said hole while rotating said magnetron in back of and about a center of said titanium target, wherein said magnetron is asymmetric about an axis about which said magnetron is rotated; and

thereafter filling tungsten into said hole of said substrate.

18. (Previously presented) The method of Claim 6, wherein an amount of said DC power is no more than 18kW normalized to a circular reference substrate of 200mm diameter.

19. (Previously presented) The method of Claim 6, wherein an amount of said DC power in combination with a size and magnetic strength of said inner and outer poles is sufficient to achieve an ionization density of said metal of at least 20%.

20. (Previously presented) The method of Claim 6, wherein said metal is a barrier metal.

21. (Previously presented) A method of sputtering a material from a target comprising a metal onto a working substrate supported on a pedestal in a system including a magnetron disposed on a side of said target opposite said pedestal and including an outer pole of one magnetic polarity and surrounding an inner pole of another magnetic polarity and being asymmetric about a center of said target, said method comprising:

rotating said magnetron about said center of said target to achieve full sputtering coverage of said target; and

capacitively coupling power into said chamber at least partially by applying DC power to said target and exciting said working gas into a plasma to sputter said metal from said target onto said working substrate.

22. (Previously presented) The method of Claim 21, wherein said magnetron has a generally triangular shape with an apex closer said center of said target than to a periphery thereof.

23. (Previously presented) The method of Claim 21, wherein an amount of DC power applied to said target is sufficient to achieve an ionization density of at least 20%.

24. (Previously presented) The method of Claim 23, wherein said metal is a barrier metal.

25. (Previously presented) The method of Claim 21, wherein said metal is a barrier metal.

26. (Previously presented) The method of Claim 21, wherein said working gas is excited into said plasma without inductively coupling power into said chamber.

27. (Previously presented) The method of Claim 21, wherein said outer pole is neither circular nor oval shaped about an axis offset from said center of said target.

28. (New) The method of Claim 6, wherein said metal comprises tantalum.

29. (New) A method of sputtering material from a target comprising a metal onto a working substrate supported on a pedestal in a system including a magnetron disposed on a side

of said target opposite said pedestal along a central axis of a vacuum chamber containing said pedestal and including an outer pole having a first magnetic polarity and a first total magnetic flux and an inner pole surrounded by said outer pole and having a second magnetic polarity opposite said first magnetic polarity and a second total magnetic flux which is larger than said first total magnetic flux by a factor of at least 1.5, said method comprising the steps of:

rotating said magnetron about said central axis;

admitting a working gas into said vacuum chamber; and

applying DC power to said target to excite said working gas into a plasma to thereby sputter said metal of said target onto said substrate.

30. (New) The method of Claim 29, wherein said metal is tantalum.

31. (New) The method of Claim 29, wherein said metal is titanium.

32. (New) The method of Claim 29, wherein said metal is tungsten.

33. (New) The method of Claim 29, further comprising admitting gaseous nitrogen into said vacuum chamber, wherein a nitride of said metal is formed on said substrate.

34. (New) The method of Claim 33, wherein said metal is tantalum.

35. (New) The method of Claim 33, wherein said metal is titanium.

36. (New) The method of Claim 33, wherein said metal is tungsten.

37. (New) The method of Claim 29, wherein said factor is at least 2.0.

38. (New) The method of Claim 29, wherein an area within a periphery of said magnetron is no more than 1/6 of a usable area of said target.

39. (New) The method of Claim 29, further comprising RF biasing said pedestal.

40. (New) A tantalum sputtering method performed in a plasma sputter reactor having a tantalum target disposed on one side of a vacuum chamber and arranged about a central axis, comprising the steps of:

supporting a substrate to be sputter coated on a pedestal electrode arranged opposite said target along said central axis;

rotating a magnetron disposed on a side of said target opposite said pedestal about said central axis, said magnetron including an inner pole of a first magnetic polarity and having a first total magnetic flux and an outer pole of a second magnetic polarity opposite said first magnetic polarity, having a second total magnetic flux greater than said first total magnetic flux by a factor of at least 1.5, and surrounding said first magnetic pole;

admitting argon into said vacuum chamber;

applying negative DC power to said target to excite said argon into a plasma to sputter said target; and

RF biasing said pedestal electrode to induce a negative DC self-bias thereupon.

41. (New) The method of Claim 40, wherein said factor is at least 2.0.

42. (New) The method of Claim 40, wherein an area within a periphery of said magnetron is no more than 1/6 of an area of said target.

43. (New) The method of Claim 40, further comprising admitting nitrogen into said vacuum chamber, whereby tantalum nitride is deposited on said substrate.